

Atty. Docket #: AG-6564

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

INTERNATIONAL APPL. NO.: PCT/EP99/05147 :
INTERNATIONAL FILING DATE: -07/20/1999- :
APPLICANT: KLAUS-PETER CRONE ET AL :
SERIAL NO: : **ART UNIT:**
FILED: -HEREWITH- : **EXAMINER:**
FOR: "METHOD OF PRODUCING :
SOLAR CELLS" :

Commissioner of Patents

Box PCT
Washington, D.C. 20231

"Express Mail" No.: EE617838642

Date: -JANUARY 29, 2001-

I hereby certify that this paper, along with any other paper or fee referred to in this paper as being transmitted herewith, is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10, postage prepaid, on the date indicated above, addressed to the Asst. Comm. for Patents, Washington, D.C. 20231

-Carrie A. McPherson-
(Typed or printed name of mailing paper or fee)

Carrie A. McPherson
(Signature of person mailing paper)

TRANSMITTAL OF APPLICATION PAPERS
TO U.S. DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. §371.
(37 CFR 1.494 OR 1.495)

This Transmittal Letter is based upon PTO Form 1390 (as revised in May, 1993).

The above-identified applicant(s) (jointly with their assignee) have filed an International Application under the P.C.T. and hereby submit(s) to the United States Designated/Elected Office (DO/EO/US) the following items and other information.

JC02 Rec'd PCT/PTO 29 JAN 2001

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. §371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. §371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. §371[f]) at any time rather than delay.
4. ☒ A proper Demand for International Preliminary Examination (IPE) was made to the appropriate Authority (IPEA) within the time period required.
5. ☒ A copy of the International Application as filed (35 U.S.C. §371[c](2)) --
 - a. ☒ is transmitted herewith (required when not transmitted by International Bureau) -in English-. See WIPO Publication WO 00/07250.
 - b. ☐ has been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ A (verified) translation of the International Application into the English language is enclosed. (See above).
7. ☐ Amendments to the (specification and) claims of the International Application under PCT Article 19 (35 U.S.C. 371[c](3))
 - a. ☐ are transmitted herewith (required if not transmitted by the International Bureau).
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☐ have not been made and will not be made.
 - e. ☐ will be submitted with the appropriate surcharge.
8. ☐ A translation of the amendments to the claims (and/or the specification) under PCT Article 19 (35 U.S.C. §371[c](3)) is enclosed or will be submitted with the appropriate surcharge.

9. ☒ An oath or declaration/power of attorney of the inventor(s) (35 U.S.C. §371[c][4]) will follow.

☐ and is attached to the translation of (or a copy of) the International Application.

☐ and is attached to the substitute specification.

10. ☒ A translation of at least the Annexes to the IPE Report under PCT Article 36 (35 U.S.C. §371[c][5]) is enclosed. ← NO ANNEXES attached to IPE, and not mentioned on IPE

Items 11. to 16. below concern other document(s) or information included:

11. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98 is enclosed.

12. ☒ An Assignment for recording and a separate cover sheet in compliance with 37 CFR 3.28 and 3.31 will follow.

13. ☒ A FIRST preliminary amendment is enclosed.
A SECOND or SUBSEQUENT preliminary amendment is enclosed.

14. ☐ A substitute specification (including claims, abstract, drawing) is enclosed.

15. ☐ A change of power of attorney and/or address letter is enclosed.

16. ☒ Other items of information:

- ☒ This application is being filed pursuant to 37 CFR 1.494(c) or 1.495(c), and any missing parts will be filed before expiration of--

☐ 22 months from the priority date under 37 CFR 1.494(c), or

☒ 32 months from the priority date under 37 CFR 1.495(c).

- ☒ The undersigned attorney is authorized by the International applicant and by the inventors to enter the National Phase pursuant to 37 CFR 1.494(c) or 1.495(c).

The following additional information relates to the International Application:

International Application No. PCT/EP99/05147

AG-6564

- ☒ Receiving Office: EPO
- ☒ IPEA (if filing under 37 CFR 1.495): EPO
- ☒ Priority Claim(s) (35 USC §§ 119, 365):
German Appln. 198 34 358.2 filed -July 30, 1998-.
- ☒ A copy of the International Search Report is
- ☐ enclosed.
- ☒ attached to the copy of the International Application.
- ☒ A copy of the Receiving Office Request Form is enclosed.

The fee calculation is set forth on the next page of this Transmittal Letter.

- ☒ PCT/IB/308 (1) sheet
- ☒ PTO/SB/05 (1) sheet

09/744722

International Application No. PCT/EP99/05147

JC02 Rec'd PCT/PTO 29 JAN 2001
AG-6564

FEE CALCULATION SHEET

☒ A check in payment of the filing fee, calculated as follows, is attached (37 CFR 1.492).

Basic Fee..... \$ 860.00

Total Number of claims in
excess of (20) times \$18..... -0-

Number of independent claims
in excess of (3) times \$80..... -0-

Fee for multiple dependent
claims \$270..... -0-

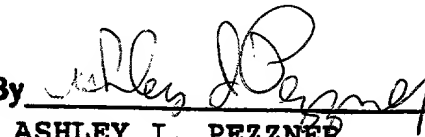
TOTAL FILING FEE... \$ 860.00

Kindly send us the official filing receipt.

The Commissioner is hereby authorized to charge any additional fees which may be required or to credit any overpayment to Deposit Account No. 03-2775. This is a "general authorization" under 37 CFR 1.25(b), except that no automatic debit of the issue upon allowance is authorized. An additional copy of this page is attached.

Respectfully submitted,

By



ASHLEY I. PEZZNER
Reg. No. 35,646

CONNOLLY BOVE LODGE & HUTZ LLP
1220 Market Street
P.O. Box 2207
Wilmington, Delaware 19899
Tel. (302) 658-9141

AIP/dés.
Enclosures

F:\docs\fori\40975 = F:\docs\pata\56657.doc
(7244*87)

Please type a plus sign (+) inside this box → ☐

PTO/SB/05 (4/98)
Approved for use through 09/30/2000. OMB 0651-0032
Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

UTILITY PATENT APPLICATION TRANSMITTAL (Only for new nonprovisional applications under 37 C.F.R. § 1.53(b))	Attorney Docket No.	AG-6564
	First Inventor or Application Identifier	CRONE ET AL
	Title	METHOD OF PRODUCING SOLAR CELLS
	Express Mail Label No.	EE617838642

APPLICATION ELEMENTS See MPEP chapter 600 concerning utility patent application contents.	ADDRESS TO: Assistant Commissioner for Patents Box Patent Application Washington, DC 20231
1. <input checked="" type="checkbox"/> * Fee Transmittal Form (e.g., PTO/SB/17) (Submit an original and a duplicate for fee processing)	5. <input type="checkbox"/> Microfiche Computer Program (Appendix)
2. <input checked="" type="checkbox"/> Specification [Total Pages 5] (preferred arrangement set forth below) <ul style="list-style-type: none">- Descriptive title of the invention- Cross References to Related Applications- Statement Regarding Fed sponsored R & D- Reference to Microfiche Appendix- Background of the invention- Brief Summary of the invention- Brief Description of the Drawings (if filed)- Detailed Description- Claim(s)- Abstract of the Disclosure	6. Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary) <ul style="list-style-type: none">a. <input type="checkbox"/> Computer Readable Copyb. <input type="checkbox"/> Paper Copy (identical to computer copy)c. <input type="checkbox"/> Statement verifying identity of above copies
3. <input type="checkbox"/> Drawing(s) (35 U.S.C. 113) [Total Sheets 0]	ACCOMPANYING APPLICATION PARTS
4. Oath or Declaration [Total Pages 0] <ul style="list-style-type: none">a. <input type="checkbox"/> Newly executed (original or copy)b. <input type="checkbox"/> Copy from a prior application (37 C.F.R. § 1.63(d)) (for continuation/divisional with Box 16 completed)<ul style="list-style-type: none">i. <input type="checkbox"/> DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) named in the prior application, see 37 C.F.R. §§ 1.63(d)(2) and 1.33(b).	7. <input type="checkbox"/> Assignment Papers (cover sheet & document(s))
*NOTE FOR ITEMS 1 & 13: IN ORDER TO BE ENTITLED TO PAY SMALL ENTITY FEES, A SMALL ENTITY STATEMENT IS REQUIRED (37 C.F.R. § 1.27), EXCEPT IF ONE FILED IN A PRIOR APPLICATION IS RELIED UPON (37 C.F.R. § 1.28).	8. <input type="checkbox"/> 37 C.F.R. § 3.73(b) Statement (when there is an assignee) <input type="checkbox"/> Power of Attorney
	9. <input type="checkbox"/> English Translation Document (if applicable)
	10. <input type="checkbox"/> Information Disclosure Statement (IDS)/PTO-1449 <input type="checkbox"/> Copies of IDS Citations
	11. <input checked="" type="checkbox"/> Preliminary Amendment
	12. <input checked="" type="checkbox"/> Return Receipt Postcard (MPEP 503) (Should be specifically itemized)
	13. <input type="checkbox"/> * Small Entity Statement(s) <input type="checkbox"/> Statement filed in prior application, Status still proper and desired (PTO/SB/09-12)
	14. <input type="checkbox"/> Certified Copy of Priority Document(s) (if foreign priority is claimed)
	15. <input checked="" type="checkbox"/> Other: PCT/IB/308 (1) sheet
	16. <input checked="" type="checkbox"/> PCT/IFA/416 & 409 (7) pages
	17. <input checked="" type="checkbox"/> PCT/RO/101 (5) sheets
16. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment: <input type="checkbox"/> Continuation <input type="checkbox"/> Divisional <input type="checkbox"/> Continuation-in-part (CIP) of prior application No: _____ Prior application information: Examiner _____ Group / Art Unit: _____ For CONTINUATION or DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 4b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.	
17. CORRESPONDENCE ADDRESS	
<input type="checkbox"/> Customer Number or Bar Code Label <input checked="" type="checkbox"/> Correspondence address below (Insert Customer No. or Attach bar code label here)	
Name	Ashley I. Pezzner, Esquire
Address	CONNOLLY BOVE LODGE & HUTZ LLP
	1220 Market Street
	P.O. Box 2207
City	Wilmington
State	DE
Zip Code	19899
Country	US
Telephone	(302) 888-6270
Fax	(302) 656-9072

Name (Print/Type)	ASHLEY I. PEZZNER	Registration No. (Attorney/Agent)	35,646
Signature	<i>Ashley I. Pezzner</i>	Date	01/29/2001

Burden Hour Statement: This form is estimated to take 622 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231.

09/744722

JC02 Rec'd PCT/PTO 29 JAN 2001

METHOD OF
PRODUCING
SOLAR CELLS

Klaus-Peter Crone
Günter Löffelmann
Karl Modemann
Eberhard Koch
-and-
Wolfgang Sauerteig

INTERNATIONAL APPLICATION
IN ENGLISH
-with-
SEARCH REPORT

PCT/EP99/05147 IFD: 07/20/1999

AG-6564 (7244*87)

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Date of Deposit
-January 29, 2001-

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Washington, D.C. 20231

-Carrie A. McPherson-
(Typed or printed name of person mailing
paper or fee)

Carrie A. McPherson
(Signature of person mailing paper or fee)

09/744722

JC02 Rec'd PCT/PTO 29 JAN 2001
AG-6564 (7244*87)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: KLAUS-PETER CRONE *ET AL.*)
SERIAL NO. TO BE ASSIGNED) ART UNIT: TO BE ASSIGNED
FILED: HEREWITH) EXAMINER: TO BE ASSIGNED
FOR: METHOD OF PRODUCING SOLAR CELLS)

Asst. Commissioner for Patents
Washington, D.C. 20231

"EXPRESS MAIL" No. EE617838642 DATE January 29, 2001
I HEREBY CERTIFY THAT THIS PAPER OR FEE IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE "EXPRESS MAIL POST
OFFICE TO ADDRESSEE" SERVICE UNDER 37 CFR 1.10 ON THE DATE INDICATED AND IS ADDRESSED TO THE
ASSISTANT COMMISSIONER FOR PATENTS, WASHINGTON, D.C. 20231

CARRIE A. MCPHERSON
(TYPED OR PRINTED NAME OF
PERSON MAILING PAPER OR FEE)

Carrie A. McPherson
(SIGNATURE OF PERSON MAILING
PAPER OR FEE)

PRELIMINARY AMENDMENT

Sir:

Prior to fee calculation and examination please amend the above-identified application as follows.

In the Claims

Amend claim 1 as follows:

In claim 1, line 8, please delete "in particular 400 to 600°C,".

Please add the following new claim(s).

- 7. The method as claimed in claim 1, wherein the coating is carried out at temperature
from 400 to 600°C. - -

REMARKS

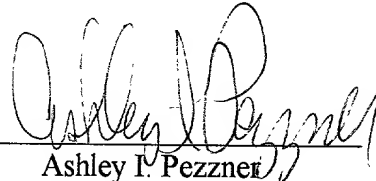
The applicants respectfully request that the preliminary amendment be entered prior to fee calculation and examination. Support for newly added claim 7 can be found in original claim 1. No fee is due for the additional claim. If there are any additional fees due in connection with the filing of this response, the Commissioner is authorized to charge or credit any overpayment to Deposit Account No. 03-2775.

A prompt and favorable action is solicited.

Respectfully submitted,

CONNOLLY BOVE LODGE & HUTZ LLP

By



Ashley I. Pezzner

Reg. No. 35,646

Tel. (302) 888-6270

AIP/cam

::ODMA\MHODMA\CB;128514;1

Method of producing solar cells

5 The invention relates to an economically improved method of producing thin-layer solar cells, e.g. CdTe solar cells (CdTe = cadmium telluride). CdTe is used below merely as an example for all thin-layer solar cells.

10 CdTe and CdTe/CdS solar cells may be produced by various methods (US-5 304 499), common to all of which is heat treatment at at least 575°C, to achieve adequate efficiency. These temperatures allow the use only of expensive types of glass as supports. The use of glass as a support has the disadvantage that glass panels may be coated with CdTe only in discontinuous manner, irrespective of the coating method selected.

15 US-5 304 499 describes a method in which coating is carried out at temperatures of only 480 to 520°C, it thus being possible to use cheap types of glass ("window glass").

20 To this end, it is necessary for the glass firstly to be provided with a transparent, electrically conductive layer, e.g. of doped tin oxide. This is followed by a thin cadmium sulfide layer (CdS), to which the light-sensitive CdTe layer is then applied by sublimation at 480 to 520°C.

25 The apparatus required for application of the CdTe layer is complex and expensive: support material and CdTe source are held in such a way by opposing graphite blocks, which are heated to the necessary temperature, that the CdTe source is located only 2 to 3 mm from the support surface. Sublimation is then effected in a 0.1 mbar inert gas atmosphere, e.g. a nitrogen, helium, argon or hydrogen atmosphere. Large areas of CdTe-coated material for producing solar cells cannot be produced economically in this way.

30 H. Nishiwaki et al, Solar Energy Materials and Solar Cells 37 (1995) 295 to 306 use a polyimide film as support because this material has sufficient heat resistance in

comparison to polyethylene terephthalate (PET) and polyethylene naphthalate (PEN), because of its glass transition temperature of more than 500°C. Polyimide has the disadvantage to be insoluble in usual solvents and to be unable to be molten. It is therefore extremely difficult to be processed.

5

The known methods do not permit the use of easily produceable films of polymeric organic materials as supports.

10

The object of the invention was the economic production of a support with a photovoltaically active layer, e.g. a CdTe layer.

15

A method was surprisingly found, which permits the use of flexible polymeric films for coating with CdTe and annealing, without the polymeric supporting material being damaged by the high temperatures. In this way, a starting material is obtained for high efficiency solar cells.

20

The invention therefore provides a method of coating organic polymeric supporting materials with CdTe and annealing the CdTe layer of the materials thus coated, characterised in that the supporting material consists of a polymeric material with a glass transition temperature of from 90°C to 200°C and coating of the CdTe layer is carried out at temperatures below the glass transition temperature and annealing at temperatures of at least 250°C, in particular 400 to 600°C, by means of a laser for 0.01 to 1 s with an energy of 2 to 5000 watt per mm².

25

Preferably the supporting material is at least 60 µm, in particular 90 to 120 µm, thick and the CdTe layer is at most 30 µm, in particular 2 to 7 µm, thick.

30

Coating is carried out for example with an aqueous or solvent-containing CdTe suspension.

The material is then dried. Suitable coating methods are, for example, flooding and, knife coating.

5 Annealing may be carried out several times; cooling phases are preferably provided between pairs of annealing steps.

10 Suitable polymers are PET and PEN. Prior to coating, the polymeric supporting material may be provided with a substrate layer, e.g. of indium-tin oxide, which improves the adhesion of the CdTe layer. The substrate layer should be transparent and electrically conductive.

Suitable lasers are, for example, argon lasers and yag lasers with frequency duplication.

15 Organic polymeric supporting materials are flexible and thus permit continuous coating using a suitable coating method.

20 It is especially advantageous for the CdTe particles to be particularly fine, in particular in the form of so-called nano-particles, i.e. particles whose average diameter lies in the nanometric range and amounts, for example, to from 3 to 5 nm.

In this case, it is expedient for an agent to be present during production of the nanoparticles which prevents agglomeration of the nanoparticles, e.g. tributyl-phosphane.

25 The invention also provides a solar cell comprising at least one CdTe layer at most 30 μm thick on a support, characterised in that the support is a polymeric organic material at least 60 μm thick and having a glass transition temperature of at least 90°C.

30 Owing to its flexibility, the polymeric organic support permits continuous coating by means of a coater, for example a meniscus or curtain coater, as known from the coating of photographic films.

Example

- 5 A film of PEN 100 μm thick and 100 cm wide is coated continuously with a suspension containing a dispersant and 31 g of cadmium telluride per litre. The coated film is then dried and the layer applied exhibits a dry layer thickness of 5 μm .

The film is annealed as follows:

- 10 The entire surface is irradiated with an Ar ion laser (wavelength 514 nm; power 7 W) with a focal point of 50 μm . The temperature is adjusted at from 400 to 450°C.

After annealing, the film exhibits light-dependent electrical resistance and is thus suitable for the production of a photovoltaic cell.

- 15 The supporting material is not damaged by exposure to the laser.

Claims

1. A method of coating organic polymeric supporting materials with at least one photovoltaically active layer and annealing the materials thus coated,
5 characterised in that the supporting material consists of a polymeric material with a glass transition temperature of from 90°C to 200°C. Coating is carried out at temperatures below the glass transition temperature and annealing at temperatures of at least 250°, in particular 400 to 600°C, by means of a laser for 0.01 to 1 s with an energy to 2 to 5000 watt per mm².
10
2. A method according to claim 1, wherein the supporting material is at least 60 µm thick and the photovoltaic layer is at most 30 µm thick.
3. A method according to claim 1, wherein the supporting material is of
15 polyethylene terephthalate or polyethylene naphthalate.
4. A solar cell comprising at least one photovoltaically active layer on a support, characterised in that the support is a polymeric organic material having a glass transition temperature of from 90°C to 200°C.
20
5. A solar cell, according to claim 4, characterised in that the photovoltaically active layer comprises cadmium telluride.
6. A solar cell according to claim 4, characterised in that the support consists of
25 polyethylene terephthalate or polyethylene naphthalate.

COMBINED DECLARATION AND POWER OF ATTORNEY

Attorney Docket No.

AG 6564 (7244*87)

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled **METHOD FOR PRODUCING SOLAR CELLS**

to specification of which

(check one) ☐ is attached hereto.

☒ was filed on 07/20/99 as International Patent Application PCT/EP99/05147 and including all the amendments through the date hereof

Application Serial No. 09/ 744,722 and

was amended on _____
(if applicable)

was amended through _____
(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under 35 U.S.C. §119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or §365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)

Priority Claimed

WO 00/07250 (Number)	World (Country)	10/02/00 (Day/Month/Year Filed)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
_____ (Number)	_____ (Country)	_____ (Day/Month/Year Filed)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
_____ (Number)	_____ (Country)	_____ (Day/Month/Year Filed)	<input type="checkbox"/> Yes	<input type="checkbox"/> No

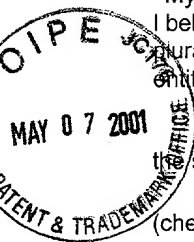
I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose to the Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application

_____ (Application Serial No.)	_____ (Filing Date)	_____ (Status) (patented, pending, abandoned)
_____ (Application Serial No.)	_____ (Filing Date)	_____ (Status) (patented, pending, abandoned)

I hereby claim the benefit under 35 U.S.C. §119(e) of any United States provisional application(s) listed below.

(Application No.) _____
(filing date)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.



THIS DOCUMENT IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT PERMISSION IN WRITING FROM THE PATENT & TRADEMARK OFFICE.

**UNITED STATES DEPARTMENT OF COMMERCE****Patent and Trademark Office**

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U.S. APPLICATION NO	FIRST NAMED APPLICANT	ATTY DOCKET NO
09/744722	CRONE	K
CONNOLLY BOVE LODGE & HUTZ 1220 MARKET STREET PO BOX 2207 WILLMINGTON, DE 19899		AG-6564
INTERNATIONAL APPLICATION NO		
PCT/EP99/05147		
I A. FILING DATE		PRIORITY DATE
20 JUL 99		02 MAR 2001
DATE MAILED:		

NOTIFICATION OF MISSING REQUIREMENTS UNDER 35 U.S.C. 371 IN THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US)

1. The following items have been submitted by the applicant or the IB to the United States Patent and Trademark Office as

- ☐ a Designated Office (37 CFR 1.494),
- ☒ an Elected Office (37 CFR 1.495):
- ☒ U.S. Basic National Fee.
- ☒ Copy of the international application in:
 - ☐ a non-English language.
 - ☒ English.
- ☐ Translation of the international application into English.
- ☐ Oath or Declaration of inventors(s) for DO/EO/US.
- ☐ Copy of Article 19 amendments.
- ☐ Translation of Article 19 amendments into English.
- ☒ The International Preliminary Examination Report in English and its Annexes, if any.
- ☐ Translation of Annexes to the International Preliminary Examination Report into English.
- ☒ Preliminary amendment(s) filed 29 JAN. 2001 and _____.
- ☐ Information Disclosure Statement(s) filed _____ and _____.
- ☐ Assignment document.
- ☐ Power of Attorney and/or Change of Address.
- ☐ Substitute specification filed _____.
- ☐ Verified Statement Claiming Small Entity Status.
- ☐ Priority Document.
- ☒ Copy of the International Search Report ☒ and copies of the references cited therein.
- ☒ Other: RO 101, IB 306, 308

2. The following items **MUST** be furnished within the period set forth below in order to complete the requirements for acceptance under 35 U.S.C. 371:

- ☐ a. Translation of the application into English. Note a processing fee will be required if submitted later than the appropriate 20 or 30 months from the priority date.
 - ☐ The current translation is defective for the reasons indicated on the attached Notice of Defective Translation.
- ☐ b. Processing fee for providing the translation of the application and/or the Annexes later than the appropriate 20 or 30 months from the priority date (37 CFR 1.492(f)).
- ☒ c. Oath or declaration of the inventors, in compliance with 37 CFR 1.497(a) and (b), identifying the application by the international application number and international filing date.
 - ☐ The current oath or declaration does not comply with 37 CFR 1.497(a) and (b) for the reasons indicated on the attached PCT/DO/EO/917.
- ☒ d. Surcharge for providing the oath or declaration later than the appropriate 20 or 30 months from the priority date (37 CFR 1.492(e)).

3. Additional claim fees of \$ _____ as a ☐ large entity ☐ small entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due. See attached PTO-875.

ALL OF THE ITEMS SET FORTH IN 2(a)-2(d) AND 3 ABOVE MUST BE SUBMITTED WITHIN ONE MONTH FROM THE DATE OF THIS NOTICE OR BY ☐ 21 OR ☒ 31 MONTHS FROM THE PRIORITY DATE FOR THE APPLICATION, WHICHEVER IS LATER. FAILURE TO PROPERLY RESPOND WILL RESULT IN ABANDONMENT.

The time period set above may be extended by filing a petition and fee for extension of time under the provisions of 37 CFR 1.136(a).

4. Translation of the Annexes **MUST** be submitted no later than the time period set above or the annexes will be cancelled. Note processing fee will be required if submitted later than 30 months from the priority date.5. ☐ The Article 19 amendments are cancelled since a translation was not provided by the appropriate 20 (37 CFR 494(d)) or 30 (37 CFR 1.495(d)) months from the priority date.

Applicant is reminded that any communication to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above. (37 CFR 1.5)

A copy of this notice MUST be returned with this response.

Enclosed:

☐ PCT/DO/EO/917☐ Notice of Defective Translation☐ PTO-875

FORM PCT/DO/EO/905 (December 1997)

Christine S. Washington

Telephone: 703-305-3752

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith:

In the matter of the above-identified application, please recognize Rudolf E. Hutz, Reg. No. 22,397; John D. Fairchild, Reg. No. 19,756; Harold Pezzner, Reg. No. 22,112; Richard M. Beck, Reg. No. 22,580; Paul E. Crawford, Reg. No. 24,397; Thomas M. Meshbesh, Reg. No. 25,083; Patricia Smink Rogowski, Reg. No. 33,791; Robert G. McMorrow, Jr., Reg. No. 30,962; Ashley I. Pezzner, Reg. No. 35,646; William E. McShane, Reg. No. 32,707; Mary W. Bourke, Reg. No. 30,982; Gerard M. O'Rourke, Reg. No. 39,794; Allan N. Kutzenko, Reg. No. 38,945; James M. Olsen, Reg. No. 40,408; Francis DiGiovanni, Reg. No. 37,310; J. Kenneth Joung, Reg. No. 41,881; Frank Z. Yang, Reg. No. 35,417; and Eric J. Bain, Reg. No. 42,517 all of P.O. Box 2207, Wilmington, Delaware 19899-2007 as attorneys with full power of substitution to prosecution this application and conduct all business in the Patent and Trademark Office connected therewith..

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Send Correspondence To: Connolly Bove Lodge & Hutz LLP P.O. Box 2207 Wilmington, Delaware 19899-2207		Direct Telephone Calls To: (302) 658-9141
FULL NAME OF SOLE OR FIRST INVENTOR Klaus Peter Crone	INVENTOR'S SIGNATURE <i>Klaus Peter Crone</i>	DATE 1.3.2001
RESIDENCE Im Bungert 4, D53773 Hennef DEX		CITIZENSHIP German
POST OFFICE ADDRESS Kaiser-Wihelm-Allee, 51373 Leverkusen		
FULL NAME OF SECOND JOINT INVENTOR IF ANY Günter Löffelmann	INVENTOR'S SIGNATURE <i>Günter Löffelmann</i>	DATE 14.03.2001
RESIDENCE AmDomberg 9, D-51515 Kürten DEX		CITIZENSHIP German
POST OFFICE ADDRESS Kaiser-Wihelm-Allee, 51373 Leverkusen		
FULL NAME OF THIRD JOINT INVENTOR IF ANY Karl Modemann	INVENTOR'S SIGNATURE <i>Karl Modemann</i>	DATE 5.3.2001
RESIDENCE Heinrich-Heine-Strasse 39, D-53225 Bonn DEX		CITIZENSHIP German
POST OFFICE ADDRESS Kaiser-Wihelm-Allee, 51373 Leverkusen		
FULL NAME OF FOURTH JOINT INVENTOR IF ANY Eberhard Koch	INVENTOR'S SIGNATURE <i>Eberhard Koch</i>	DATE 06.03.2001
RESIDENCE Königsberger Strasse 34, D-51399 Burscheid DEX		CITIZENSHIP German
POST OFFICE ADDRESS Kaiser-Wihelm-Allee, 51373 Leverkusen		
FULL NAME OF FIFTH JOINT INVENTOR IF ANY Wolfgang Sauerteig	INVENTOR'S SIGNATURE <i>Wolfgang Sauerteig</i>	DATE 9.3.2001
RESIDENCE Walter-Flex-Strasse, D-51373 Leverkusen DEX		CITIZENSHIP German
POST OFFICE ADDRESS Kaiser-Wihelm-Allee, 51373 Leverkusen		
FULL NAME OF SIXTH JOINT INVENTOR IF ANY	INVENTOR'S SIGNATURE	DATE
RESIDENCE		CITIZENSHIP
POST OFFICE ADDRESS		
FULL NAME OF SEVENTH JOINT INVENTOR IF ANY	INVENTOR'S SIGNATURE	DATE
RESIDENCE		CITIZENSHIP
POST OFFICE ADDRESS		

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